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Introduction

The topic of the ECMWF Seminar Series in 2009 was Diagnosis of Forecasting and Data Assimilation Systems. This topic was chosen because more powerful diagnostic techniques are required if we are to identify and understand residual weaknesses in our forecasting system and maintain the current pace of forecast system improvement. Furthermore, effective diagnostics techniques are required to understand the functioning of the climate system with all its complexity.

The lectures covered a wide range of different diagnostic techniques including numerical experimentation, linear inverse models, trajectories and tracer diagnostics, PV diagnostics, initial tendencies, seamless approaches, adjoint models, relaxation experiments, observing system experiments, and error backtracking.

The fact that understanding and predicting the coupled climate systems is becoming ever more important is reflected in the content of a number of lectures which cover components of the climate system other than the atmosphere, such as the ocean and sea ice.

Traditionally, diagnostic work has focused mainly on the deterministic aspects of forecasting systems. However, since the forecasting problem is fundamentally probabilistic, attention was also given to diagnostics of ensemble forecasting systems.

The ECMWF seminar series is part of our commitment to our Member States, and ECMWF thanks all the lecturers for their efforts in explaining diagnostic techniques which help further our knowledge and understanding and for providing written contributions which form this proceedings.

All lectures and contributions are available from the ECMWF website following the seminar link (http://www.ecmwf.int/ newsevents/meetings/annual_seminar/2009/).